Awards to Facilitate Geoscience Education

Announcement of Opportunity

Directorate for Geosciences

Proposal Submission Deadline: ***January 20, 1998***

NATIONAL SCIENCE FOUNDATION

NSF 97-174

National Science Foundation

The National Science Foundation (NSF) provides awards for research and education in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. NSF therefore does not assume responsibility for the research findings or their interpretation.

NSF welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of its research- and education-related programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. For more information, consult the program announcement (NSF 91-54) or contact the program coordinator at 703/306-1636.

The National Science Foundation has Telephonic Device for the Deaf (TDD) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial 703/306-0090; for FIRS, dial 800/877-8339.

****

Privacy Act. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. (See System of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995), Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994).)

Public Burden. Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award. The public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to Gail A. McHenry, Reports Clearance Officers, Information Dissemination Branch, National Science Foundation, 4201 Wilson Boulevard, Suite 245, Arlington VA 22230.

ANNOUNCEMENT OF OPPORTUNITY

Awards to Facilitate Geoscience Education

Background

The National Science Foundation's (NSF) Directorate for Geosciences (GEO) and its Advisory Committee for Geosciences (AC/GEO) have identified geoscience education as a high priority. Geoscience education contributes to a higher degree of scientific understanding among the general population, and it helps knowledgeable and skilled individuals assume positions as productive geoscientists in the future. Geoscience education therefore is an investment in the future of the Nation as well as in the future of the geosciences themselves. GEO supports the work of outstanding geoscience researchers, who push the frontiers of knowledge of how the Earth works. GEO seeks to further facilitate the involvement of leading researchers in efforts to improve the quality of geoscience education at all levels, thereby facilitating the effective integration of research and education.

In order to plan effectively for this activity, GEO and AC/GEO established the Geoscience Education Working Group (GEWG), composed of a diverse representation from the geosciences research and education communities, members of AC/GEO, and GEO staff. The GEWG conducted a workshop at NSF on August 29-30, 1996. Recommendations from that workshop are presented in a special report titled *Geoscience Education: A Recommended Strategy* (NSF 97-171). This report is available on the GEO Web site (http://www.geo.nsf.gov); e-mail requests for hard copies should be sent to geoed@nsf.gov.

The GEWG report recognizes that significant opportunities exist at all levels and that significant linkages exist among them:

- ***Graduate and Postdoctoral Education and Training.*** In order to have well-educated, capably trained geoscientists to address a diverse range of topics in a broad range of settings, graduate and postdoctoral education and training need to provide individuals with a breadth of perspectives, skills, and experiences, including capabilities for collaborating in interdisciplinary research.
- ***Undergraduate Education.*** In order to prepare undergraduate students for careers in the geosciences or to improve their knowledge of the Earth as part of a comprehensive education, undergraduate geoscience education needs to develop and use new teaching approaches and modern technologies. Students also need direct involvement with top-notch researchers and access to many large data sets developed by geoscientists.
- ***Elementary and Secondary Education.*** The geosciences provide a natural window on the world of science, and the new National Science Education Standards place the geosciences on par with the physical and biological sciences. Improvements therefore are needed in elementary and secondary education, including the development of more integrated curricula, educational materials that provide students with opportunities for hands-on discovery using the most advanced data and techniques, and teachers who are well-trained in the geosciences.
- ***Education Outside the Classroom.*** In order to capitalize on widespread interest in geoscience phenomena and to increase public understanding of natural processes, the geosciences need to enhance the presentation of information through traditional non-classroom educational settings, such as museums and television programming. Geoscientists also can take advantage of new media like the Internet and computer-based visualizations.

Special Competition for Awards to Facilitate Geoscience Education

The Directorate for Geosciences has identified a set of activities through which it will work with other organizations to advance geoscience education. Foremost among these activities is a special competition for Awards to Facilitate Geoscience Education, to be conducted during Fiscal Year 1998. This announcement also contains suggestions regarding other possible sources of support for geoscience education activities, including the Research Experiences for Undergraduates (REU) program.

GEO invites submission of proposals that describe projects to enhance geoscience education. Through awards made following the evaluation of proposals submitted in response to this announcement, GEO intends to facilitate the initiation or piloting of innovative educational activities by geoscience researchers where support may not otherwise be available. In appropriate cases, awards could be made by supplementing active research grants. Examples of possible activities that might be supported are:

- Initiation of innovative geoscience courses and curricula
- Bringing cutting-edge research to the classroom or to the public
- Partnerships to implement the National Science Education Standards
- Technologies to reach small and community colleges more effectively
- Development of Web-based pedagogy
- Opportunities for teachers to work with scientists
- Workshops for training of geoscientists in educational issues
- Planning grants for interdisciplinary research on geoscience education
- Workshops to organize pre-college data collection programs
- Partnering for initiation of museum exhibits
- Support for outreach activities of professional societies
- Distinguished geoscience lecture series
- Development of state-based alliances of geoscience researchers, educators, and practitioners
- Innovative use of university consortia networks for sharing of resources

GEO expects these projects to be focused as well as to have potentially broad impact that may lead to innovative intellectual developments or that involve innovative partnerships. Funding provided through these awards should be catalytic; long-term funding will not be provided. Instead, these awards will provide start-up funding to enable projects to reach a level of maturity so that they can compete successfully for long-term funding from other sources.

These awards are intended to complement but not replicate activities supported by NSF's Directorate for Education and Human Resources (EHR). GEO expects successful projects to engage the expertise of educators and/or members of the education research community in appropriate ways in order to guarantee their effectiveness. GEO and EHR staff are prepared to work together to assist geoscientists in identifying educators or educational researchers who can work together on geoscience education teams.

Institutional cost-sharing is welcome, as are other forms of support from other sources that will enable projects to be completed successfully.

Proposal Submission and Evaluation

Investigators seeking support through this special competition are ***strongly encouraged*** to outline their plans and contact the Geoscience Education Coordinator, Dr. Michael Mayhew, well in advance of their submission of a formal proposal. Communications with Dr. Mayhew are best handled via e-mail, sending the message to mmayhew@nsf.gov or geoed@nsf.gov. If e-mail is inconvenient, Dr. Mayhew can be reached by phone at 703/306-1557 or by fax at 703/306-0382. The primary purpose for this preliminary contact is to enable investigators to learn whether their proposed activities are appropriate for consideration in this competition or in any other NSF competition.

The competition will be based on the evaluation of formal proposals submitted to NSF by institutions on behalf of investigators. Proposals should be prepared in accordance with requirements specified in the NSF *Grant Proposal Guide* (NSF 98-2). Be sure to adhere to page limitations specified in that document. The cover sheet for the proposal should bear the original signature of the principal investigator, any co-principal investigators, and an authorized organizational representative. Please refer to "Geoscience Education" in the top left box of the proposal cover sheet and to the number of this announcement (NSF 97-174) in the second box. An original plus twenty (20) copies of the full proposal should be submitted**.**

Full proposals must be received at NSF no later than Tuesday, January 20, 1998.

The evaluation of proposals will be based on the written reviews and verbal comments by members of a specially convened panel, although written reviews from external experts may also be solicited. Proposals will be evaluated using the New Merit Review Criteria, as specified in the box below.

New NSF Merit-Review Criteria

At its meeting on March 28, 1997, the National Science Board approved the use of two new criteria to replace the four criteria that have been used by reviewers when they evaluate proposals submitted to the National Science Foundation. Those new criteria are:

1. What is the intellectual merit of the proposed activity?

The following are suggested questions to consider in assessing how well the proposal meets this criterion: How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, please comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

2. What are the broader impacts of the proposed activity?

The following are suggested questions to consider in assessing how well the proposal meets this criterion: How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Award Administration and Conditions

Contingent on the availability of funds and on the quality of proposals received, GEO expects to provide at least $800,000 to support awards received in response to this announcement during Fiscal Year 1998. A range of award sizes is anticipated. Most projects funded via this competition will be for a duration of 12 to 18 months, although longer-term funding will be considered if the justification is compelling.

Grants awarded as a result of this announcement will be administered in accordance with the terms and conditions of NSF-GC-1 (10/95) or FDP-III (7/1/96), *Grant General Conditions*. Copies of these documents are available on the NSF Web site (access this site at http://www.nsf.gov, select "Grants and Awards," then select "Online Document System") or from the NSF Forms and Publications Unit (by e-mail at pubs@nsf.gov, or by phone at 301/947-2722). More comprehensive information is contained in the *NSF Grant Policy Manual* (7/95) (NSF 95-26), for sale through the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Other Possible Sources of Support for Geoscience Education Activities

In addition to increasing the direct support it provides for activities that will enhance the quality of geoscience education, GEO encourages geoscientists – often working in collaboration with educators – to explore other sources of support within NSF.

Enhanced Research Experiences for Undergraduates (REU) Support

The long-standing NSF-wide Research Experiences for Undergraduates (REU) Program has been an effective vehicle for the integration of research and education by supporting the substantive involvement of undergraduate students in research projects. As part of its effort to enhance the quality of geoscience education, GEO intends to increase its support for REU Sites projects, which provide opportunities for small groups of undergraduate students to work on specially formulated research projects. In providing this additional REU Site funding, GEO is especially interested in supporting innovative multidisciplinary projects, increasing the involvement of precollege teachers, exploring innovative educational approaches, and significantly increasing the participation of minority students in the geosciences. GEO also is interested in supporting the innovative involvement of undergraduates as members of research teams through the use of REU supplements to existing awards.

REU proposals will continue to be reviewed in the GEO divisions as in the past. ***Proposal submission should follow the REU guidelines, as outlined in the REU program announcement (NSF 96-102).*** More information about the REU Program is available from the NSF Web site (http://www.nsf.gov/home/crssprgm/reu/start.htm).

Related Opportunities for Support from NSF's Directorate for Education and Human Resources (EHR)

Division of Undergraduate Education (DUE). This division supports curriculum and faculty development at the undergraduate level through the following programs:

- Advanced Technological Education,
- NSF Collaboratives for Excellence in Teacher Preparation,
- Course and Curriculum Development,
- Instrumentation and Laboratory Improvement, and
- Undergraduate Faculty Enhancement.
-

These programs are described in the DUE program announcement and guidelines (NSF 97-29) and at the DUE Web site (http://www.ehr.nsf.gov/EHR/DUE/start.htm).

DUE, GEO, the Keck Geology Consortium, and the American Geophysical Union (AGU) recently co-sponsored a workshop on the future of geoscience education titled "Shaping the Future of Undergraduate Education: Innovation and Change Using an Earth System Approach." A printed copy of the workshop report is available from Frank Watt Ireton at the AGU (fireton@kosmos.agu.org). The report also can be accessed from the AGU Web site (http://earth.agu.org/sci_soc/spheres/).

Division of Elementary, Secondary, and Informal Education (ESIE). This division offers the following programs to promote student, teacher, and faculty development at the precollege level and public science literacy through activities outside the classroom:

- Informal Science Education,
- Instructional Materials Development,
- Teacher Enhancement, and
- Advanced Technological Education.

These programs are described in the ESIE program announcement and guidelines (NSF 97-20) and at the ESIE Web site (http://www.ehr.nsf.gov/ESIE/index.htm).

The Informal Science Education Program recently established a program to competitively provide supplements of up to $50,000 to active NSF research grants "to assist in the broader dissemination of current research results and to promote science literacy for the general public in an out-of-school setting." The announcement of opportunity describing this activity is NSF 97-70. Information is also available from the ESIE Web site.

Division of Research, Evaluation, and Communication (REC). REC has recently established a new program titled Research on Education, Policy, and Practice (REPP), which ties together several predecessor programs. The scope of the REPP program is broad and fundamental in nature: to bring new intellectual and technological resources to bear on the problems of educational reform at all levels. REPP seeks to support high-quality, high-risk/high-payoff, long-term opportunities. The REPP program announcement is NSF 96-138. Information is also available from the REC Web site (http://www.ehr.nsf.gov/EHR/RED/index.htm).

Some Related NSF-Wide Programs

Integrative Graduate Education and Research Training Program (IGERT). This program replaces the Graduate Research Traineeship (GRT) Program. It supports innovative multidisciplinary graduate programs which integrate education and research, and which provide graduate students with access to state-of-the-art instrumentation and experience in both the academic and non-academic research settings. Its objective is to enhance the broad competency and flexibility of doctoral professionals as part of an

increasingly dynamic workforce. The program announcement is NSF 97-112; information is also available from the Division of Graduate Education (DGE) Web site (http://www.ehr.nsf.gov/EHR/DGE/igert.htm).

NSF Postdoctoral Fellowships in Science, Mathematics, Engineering, and Technology Education (PFSMETE). The objective of this program is to provide opportunities for outstanding Ph.D. recipients to develop expertise in some area of science education research in order to qualify them for academic positions which emphasize the full integration of research and education. The program announcement is available from the DGE Web site (http://www.ehr.nsf.gov/EHR/DGE/pfse1.htm).

Faculty Early-Career Development Program (CAREER). This program seeks to support new faculty in launching a career which balances educational and research pursuits and seeks to fully integrate the two. The program announcement is NSF 97-87; additional information is available from the NSF Web site (http://www.nsf.gov/home/crssprgm/career/start.htm).

The National Science Foundation (NSF) promotes and advances scientific progress in the United States by competitively awarding grants for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, or to access abstracts of awards, visit the NSF Web site at:

http://www.nsf.gov

- Location: 4201 Wilson Boulevard
Arlington VA 22230

- For general information about NSF, contact the NSF Information Center: 703/306-1234

- TDD (for the hearing-impaired): 703/306-0090

- To order publications or forms:

  Send an e-mail to: pubs@nsf.gov

  Or telephone: 301/947-2722

- To locate NSF employees, call: 703/306-1234

OMB 3145-0058
P.T.: 20, 25, 34, 36, 42, 44
K.W.: 0501000, 0502000, 0503000, 0504000, 0505000, 1001000, 1005000, 1007000, 1008000
CFDA 47.050

NSF 97-174 (New)